981,085

PATENT SPECIFICATION 981,085

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

A Machine for Shaping or Finishing Artificial Masonry Blocks.

I, FRANZ HINSE, a Citizen of the Federal Republic of Germany, of 15 Landsknechtstrasse, Freiburg/Breisgau, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a machine for shaping or finishing artificial masonry blocks for use in dry masonry or building.

Dry building, i.e. without mortar, with masonry blocks, is known. If the masonry blocks are to be capable of load-bearing, then they must have plane-parallel bounding faces, at least at two opposite faces, viz., the upper and under side of each block, so that a perpendicular wall can be erected by using such blocks. In order to meet this requirement, already blocks of this type have been shaped or finished by the use of grinding wheels, which, however, have the great disadvantage that much dust is produced, and, owing to the high degree of abrasion of segments of the wheels, the accuracy of the process leaves much to be desired. There is also the further disadvantage that grinding wheels can produce smooth surfaces only, but not profiles such as grooves and tongues which are necessary for the mutual locking against shifting of blocks arranged in layers one above the other The shaping or finishing of masonry blocks with a metal tool, preferably of Widia (Registered Trade Mark) steel (metal carbide) is known in the so-called masonry millers which are used, for instance, to cut slots for channels for installation ducts in walls, or to part blocks. In work of this type, however, the tool is guided more or less by hand so that no very high degree of accuracy can be attained in regard to the size and position of the milled parts of the wall.

[P ....]

In order to obtain with artificial masonry blocks which are to be used in dry building, the necessary accuracy in the shaping of grooves and tongues and other milled details in masonry blocks, a milling machine is contemplated by the invention. The milling machine produces highly-accurate, grooves and tongues which exactly complement one another on the upper and under sides of the masonry block, as well as at least one recess or cut-out centred in the perpendicular longitudinal centre plane of the block at the underside thereof. There are therefore provided a pair of milling cutters working simultaneously with a fixed or predeterminedly adjustable gap between them. The pair of rigidly-coupled milling cutters is advantageously made movable on a slide or carriage. This slide or carriage ensures accurate track guidance for the milling cutters in the same manner as the slide of a machine tool with a reciprocating slide block on which the cutter travels.

Each milling cutter is preferably shaped as a roller and is built up of individual cutter discs. By suitably profiling the disc assembly of each milling cutter from a basic cylindrical shape, grooves and tongues which exactly complement one another can be produced on the upper and under sides of the masonry block, as well as at least one recess or cut-out centred in the perpendicular longitudinal centre plane of the block at the underside of the block. The feed or advance and also the rotation of the milling cutters are suitably produced by variably-controllable drives so that the individual speeds especially at the ends of the block on its underside can be adjusted. The feed or advance as well as the rotation of the milling cutters are suitably obtained by adjustably controllable drives so that the individual speeds, for instance, at the end of

a block or a row of blocks, can be adjusted to the required conditions, for instance, to prevent the edges of the block crumbling and to avoid dust.

Artificial masonry blocks are, for instance, blocks which are air-dried after shaping, i.e. which are stacked after shaping in long rows, in order to harden. The machine according to the invention is particularly suited to this process in that it is movable on tyres or rails along the stacking ground where the blocks are hardened and with the help of two columns with slewing jibs and hoisting gear, is equipped for fetching the blocks to be worked and for removing the finished, shaped blocks. The hoisting gear on the slewing jib of the machine has suspended therefrom a multi-pronged fork, by means of which several building blocks can be caught hold of and lifted simultaneously. The artificial building blocks are of large size and in order to reduce their specific weight have cavities into which the prongs can be inserted to lift the blocks

After new blocks have been passed into the machine, these are pressed, during the shaping through the intermediary of props on each block against supports preferably arranged adjacently in pairs by a sliding bridge, which can be raised and lowered and is preferably hydraulically-actuated. This is necessary in order that the blocks will not be displaced by the milling machine during shaping. The props which hold the blocks can be actuated by hydraulic means or by resilient pressure. The speed of the milling cutters is adjustable and because of this it is possible to adjust the cutter speed to suit the hardness of the blocks to be shaped. The speed also influences the amount of wear of the cutting tool and the formation of dust. It has also been found useful to maintain a low speed of the milling cutters but on the other hand their rates of feed per second should be relatively high. It has also proved advantageous to provide the milling heads of which each roller miller is composed, with cutters not uniformly spaced over the periphery, but so as to leave gaps between the individual cutter blades or groups of blades, which gaps facilitate the removal of the milled-out material produced by the milling cutter. To give an idea of the amount of waste occurring, it may be mentioned that the block is about 1 cm. thicker before shaping than afterwards. It is necessary to allow for such great over-dimensioning of the rough blocks because moulded or fired blocks are found to show differences of this order.

The milling cutters with very hard and tough blades, in particular of carbide steel, last for shaping about 50,000 blocks and during this time are worn down by not more than 0.1 mm., i.e. within the allowable tolerance limits. The distance between the miller axes of a pair of milling cutters is adjustably by a small amount to compensate for the wear of the milling cutter.

It is advisable to equip the outermost discs of a roller miller with cutters having blades or cutting edges which are pitched obliquely with the innermost end of the slope leading in the operative direction.

As a rule, the machine according to the invention is made to travel along a stack of blocks, laid out for air-drying, whereupon with the help of the two slewing jibs and the multi-pronged fork hanging from each hoist, the blocks are lifted from the stack on to the machine and thereafter set down. A reversal of this procedure is also possible however, whereby the blocks to be shaped are fed through the machine on slide rails and then fed between one or more pairs of fixed milling cutters. In addition to shaping only two sides of the block, it is also possible to shape four or six sides thereof. In the case of a preferentially travelling machine, it must be carefully ensured that the carriage is, at least in regard to the slide rails for the pair of milling cutters, of perfectly-rigid construction so that the milling cutters are always being guided by parallel tracks.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing in which: —

Fig. 1*a* is a side elevation of a machine according to the invention for the shaping or finishing of artificial masonry blocks;

Fig. 1*b* is a front elevation of the machine;

Fig. 2 is a plan view of the machine;

Fig. 3 shows a pair of milling cutters which are parallel both when stationary and rotating;

Fig. 4 shows the arrangement of the cutter blade in a milling disc; and

Figs. 5 and 6 show other forms of milling cutters which can be used in a machine according to the invention.

In Figs. 1*a* and 1*b*, 1 denotes the frame or slide rails of a carriage, movable along the rails, for a milling device 2. Milling cutters 2 of this kind are arranged in pairs on the carriage so that the second cutter is on the other side of the carriage. For shaping in the machine, blocks 3 rest on a bearing bridge 4 through the intermediary of props 5 which support the individual blocks. Only two such props are provided for each block in order to obtain a positive bearing therefor. From above, the blocks are loaded by a sliding bridge 6 in order to hold them immovably fixed during shaping. Here also two props 7 are always provided for each block. The sliding bridge 6 can be raised and lowered, for instance, hydraulically. It is, however, also possible to press

the clamping props 7 against the stone or block hydraulically or resiliently. At each end of the mobile machine, there is a column 8 with in each case a slewable jib 9 which is equipped with lifting tackle.

In Fig. 2, the same references are used as in Figs. 1*a* and 1*b* to denote similar parts. The milling cutters 2 arranged in pairs can slide along the pair of rails 1. On the slewing arm 9 of each column there is suspended a fork 10, itself also slewable, with a plurality of prongs which engage in internal cavities of blocks 3 and each time introduce a batch of three or more blocks into the machine. This feeding motion can be effected for instance manually, and the motion of discharging the shaped blocks by the other slewing arm 9 can be effected likewise. Conveyor belts can also be provided.

Fig. 3 shows the construction and mounting of the milling cutters 16 in detail. The left-hand milling cutter, which here shapes the upper side of the block, rotates about its shaft 11, and the right-hand milling cutter, which here shapes the lower or underside of the block, about its shaft 11*a* which is constantly parallel with the shaft 11. The milling cutters are composed of individual cutter discs as can be seen particularly from the representation of the milling disc 12. In this cutter disc 12, the blade or cutter edges are pitched obliquely to the milling cutter axis, the important thing being that they are oblique with the innermost ends thereof leading considering the direction of rotation in operation (see arrow). By this means, it is obtained that the milling cutter shapes the edges of the block, in this case the outer surface of a tongue at the underside of the block, cleanly in order to obtain as little crumbling as possible at the edges of the block. The uppermost cutting disc 13 of the right-hand milling cutter 16 is correspondingly pitched obliquely to the axis of the shaft 11*a* with the innermost end of the slope leading considering the direction of rotation in operation, in order in this case also to prevent as far as possible crumbling at the pertaining extreme outer edge 15 of the block while shaping the outer surface of another tongue at the underside of the block.

The milling cutter disc 20 on the shaft 11*a* produces a deep groove or cut-out along the perpendicular longitudinal centre line on the lower side of the block and, furthermore, the discs 12 and 13 in conjunction with the intermediate discs 21 produce the tongues at the extreme edges of the block. Corresponding grooves at the outer edges 15 of the opposite or upper side of the block are produced by cutter discs 14 of the left-hand milling cutter, so that the grooves and tongues exactly complement each other. The precision or grade of tolerance which can be attained is 0.1 mm. By changing the milling cutters, other profiles such as those shown at 19 in Figs. 5 and 6 are also possible. As a rule, parallel milling is used. However, milling with the cutters rotating in the same direction is also possible, depending on the material of the block.

In Fig. 4, a milling disc is shown on an enlarged scale.

The cutting blade of the milling cutter is denoted by 17 and the milling disc by 18. The disc 18 is provided with a plurality of blades 17 which are spaced around the periphery of the disc 18 in order to leave a large gap between successive blades to facilitate the removal of the cut-away material. Furthermore, the blades can always be replaced after having become worn.

WHAT I CLAIM IS:—

1. A machine for the shaping or finishing of artificial masonry blocks adapted to be used in dry building, said machine being a milling machine and including a pair of simultaneously working milling cutters each built up of individual cutter discs, said cutters having a fixed and possibly adjustable gap between them to produce grooves and tongues which exactly complement one another on the upper and under sides of the masonry block, as well as at least one recess or cut-out centred in the perpendicular longitudinal centre plane of the block, at the under side thereof.

2. A machine according to Claim 1 in which the pair of rigidly-coupled milling cutters, is movable on a slide or carriage.

3. A machine according to either preceding claim in that the feed or advance and also the rotation of each milling cutter are produced by regulable drives.

4. A machine according to any preceding claim and movable on rails or tyres alongside a stacked supply of building blocks to be shaped, the machine including one or two columns each having a slewing jib and hoisting gear for collecting blocks to be shaped and for removing finished, shaped blocks.

5. A machine according to Claim 4 in which there is suspended from said hoisting gear a multi-pronged fork, by means of which several building blocks can be removed simultaneously by said prongs engaging openings in said blocks.

6. A machine in accordance with any preceding claim including a sliding bridge, which may be hydraulically operated, presses each block by means of props, during processing, against supports, preferably two adjacent supports.

7. A machine according to Claim 6 in which the props are actuated hydraulically or by resilient pressure.

8. A machine according to any preced-

ing claim in which the speed of each milling cutter is adjustable.

9. A machine according to any preceding claim in which the speed of the milling cutters is preferably low whereas the rate of travel per second is high.

10. A machine according to any preceding claim, in which the distance between the axes of the milling cutters is adjustable to compensate for cutter wear.

11. A machine according to any preceding claim in which each milling cutter is equipped with very hard and tough cutter blades such as blades of carbide steel.

12. A machine according to any preceding claim, in which each milling cutter is a plane-milling cutter and the outermost discs thereof have working edges pitched obliquely with the innermost end of the slope leading, considering the direction of rotation in operation.

13. A machine according to any preceding claim, in which the blocks to be shaped are caused to travel while being held accurately in position on a slide track between a pair of milling cutters fixedly mounted on the machine.

14. A machine according to any preceding claim and having milling cutters adapted to shape a block on four or six sides.

15. A machine according to Claim 4 and any of Claims 5 to 14, in which a carriage mounting same is of perfectly rigid construction, at least with respect to the slide rails for the pair of milling cutters.

16. A machine for the shaping or finishing of artificial building blocks substantially as hereinbefore described with reference to the accompanying drawing.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.1a

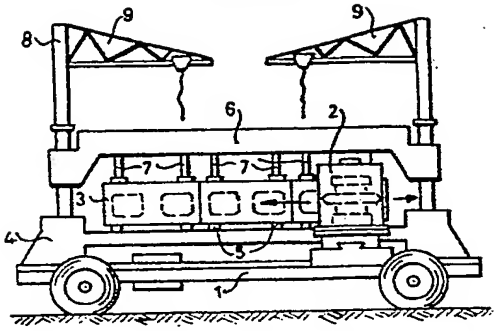


Fig.1b

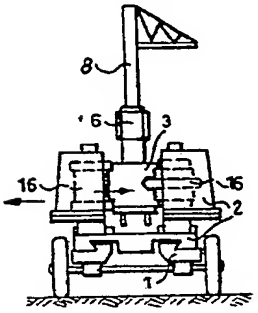


Fig.2

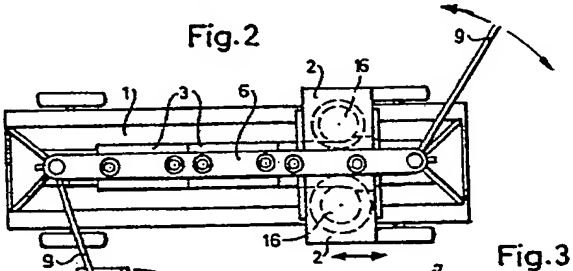
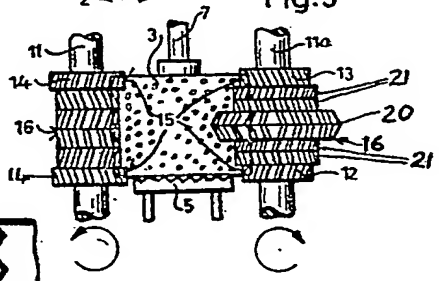
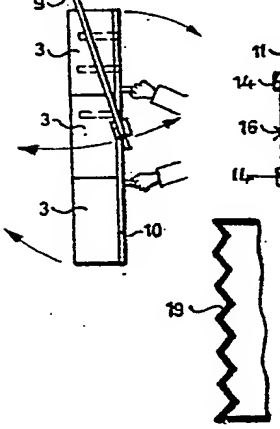


Fig.3





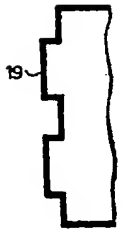


Fig.5

Fig.6

Fig.4